possible, say, 5 m (16.4 ft) as a minimum. The flues below the checker should be proportioned to permit free flow to the passes at a low velocity. If desired, the height of these flues may be stepped down, proportionally to the distance from the inlet. This, however, introduces complications in the brickwork with comparatively little gain.

The vertical velocity of the gases leaving the checkerwork may be considerable and it is necessary to provide sufficient space above the checker to get rid of the eddies which will be formed. Unless sufficient space is provided these eddies will cause considerable interference with the flow of the gas from the checker chamber into the slag pocket, converting what should be a smooth regular flow into a series of bursts or blow-throughs. These bursts may have entirely different periods in the air and gas chambers and result in considerable irregularity of combustion and waste of fuel.

In any regenerative fired furnace it is impossible to reduce the temperature of the waste gases leaving the regenerator to the temperatures of the incoming air and gas. This results in a considerable loss of heat up the chimney. Frequently one-third of the heat passes uselessly up the stack, and the amount of heat lost is more often in excess of this value than it is less.

The theoretical temperature of the waste gases at the base of the stack is about 300°. The actual temperature at the base of the stack ranges from 600° to 1000°, and rarely runs below 700°. This would seem an ideal opportunity to install a steam boiler and recover a portion of the heat, but until a comparatively few years ago such an installation was not considered, although the installation of boilers on puddling furnaces had been common practice for many years. To-day few open-hearth

furnaces are built without waste heat boiler equipment and it is extremely probable that such boilers could be profitably installed in connection with many of the other furnaces.

Considerable notice has been taken of these waste heat installations in the various technical papers, but it has been in the main simply tabulations of the installations as made with very little real information as to the underlying reasons which led to the selection of the particular equipment installed. A noticeable departure from this practice was presented by the paper of Thomas B. Mackenzie before the Iron and Steel Institute, in 1918.